

**NEW HAMPSHIRE  
DEPARTMENT OF ENVIRONMENTAL SERVICES  
SHELLFISH PROGRAM: 2005 ANNUAL REPORT**



June 2006

New Hampshire Department of Environmental Services  
Water Division  
Watershed Management Bureau  
[www.des.nh.gov](http://www.des.nh.gov)



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DEPARTMENT OF ENVIRONMENTAL SERVICES  
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June 2006

*Cover Photo: NHDES staff deploying caged blue mussel samples in Gosport Harbor. Transplanted mussels are tested for paralytic shellfish poisoning, or “red tide,” weekly in spring, summer, and fall.*

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## **INTRODUCTION AND PURPOSE OF REPORT**

The New Hampshire Department of Environmental Services (DES), under the authority granted by RSA 143:21 and 143:21-a, is responsible for classifying shellfish growing waters in the State of New Hampshire. The purpose of conducting shellfish water classifications is to determine if growing waters meet standards for human consumption of molluscan shellfish. DES uses a set of guidelines and standards known as the National Shellfish Sanitation Program (NSSP) for classifying shellfish growing waters. These guidelines were collaboratively developed by state agencies, the commercial shellfish industry, and the federal government in order to provide uniform regulatory standards for the commercial shellfish industry. The NSSP is used by DES to classify all growing waters, whether used for commercial or recreational harvesting, because these standards provide a reliable methodology to protect public health. Furthermore, RSA 485-A:8 (V) states that “Those tidal waters used for growing or taking of shellfish for human consumption shall, in addition to the foregoing requirements, be in accordance with the criteria recommended under the National Shellfish Program Manual of Operation, United States Department of Food and Drug Administration.”

This document represents the sixth Annual Report of the DES Shellfish Program. The preparation of an Annual Report serves two purposes. The first is to comply with the NSSP requirement for an annual review of growing area classifications. The second is to report to the citizens of the State of New Hampshire on the activities and accomplishments of the DES Shellfish Program, to describe water quality status and trends in shellfish growing areas, and to outline future activities to improve water quality and expand harvesting opportunities.

## **PROGRAM ACTIVITIES AND ACCOMPLISHMENTS**

### **Monitoring Programs**

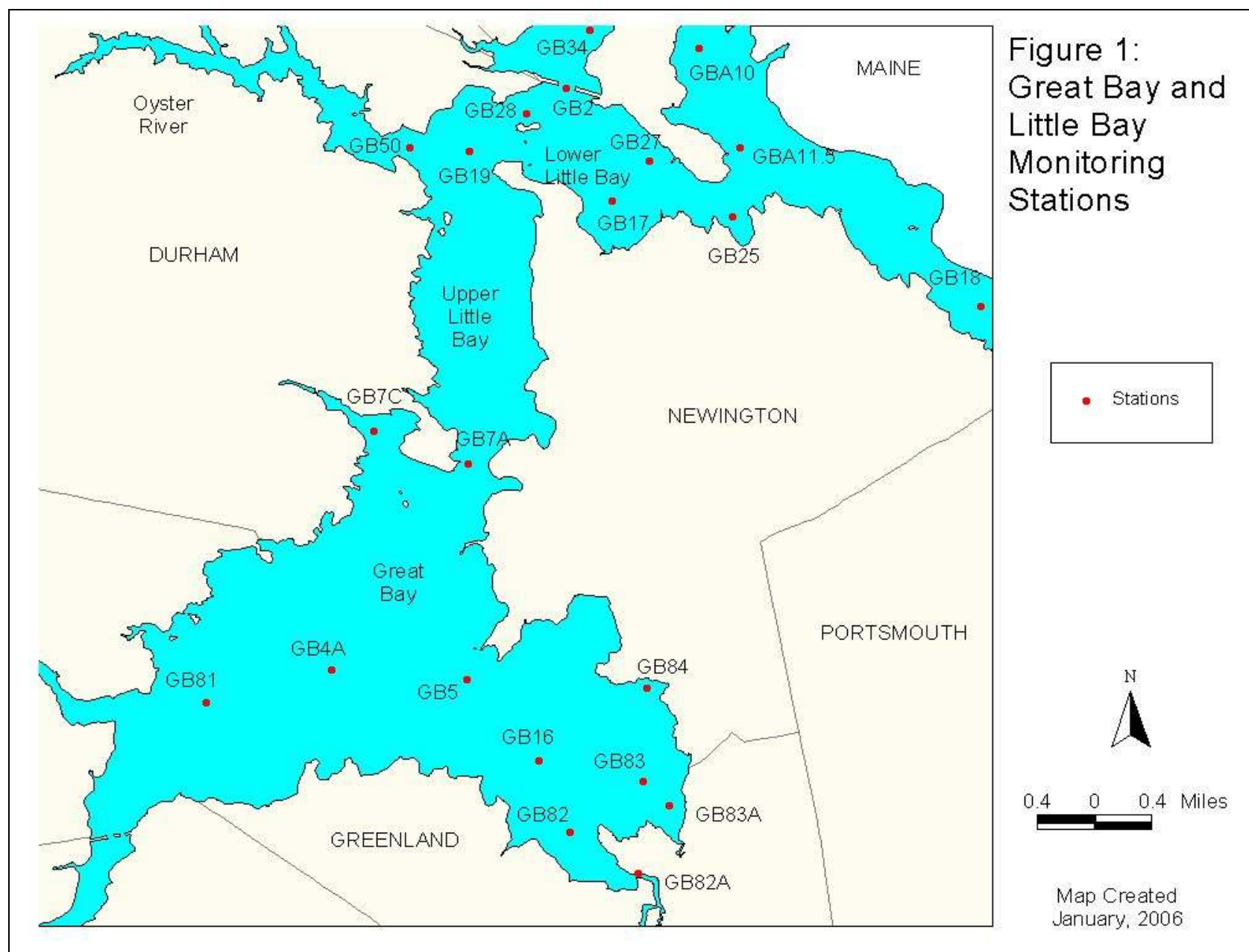
#### **Routine Monitoring**

The DES maintains a routine shellfish water-monitoring program in all tidal waters in the State of New Hampshire. The focus of this program is to collect and test water samples for fecal coliform bacteria, which is used as an indicator of contamination from human or animal waste. Data generated by this program are used to annually review shellfish water classifications. Seventy-two stations in the Great Bay Estuary (including the Piscataqua River), Little Harbor/Back Channel, Rye Harbor, the Atlantic Coast, and the Hampton/Seabrook Estuary were sampled on a monthly basis for most of the year in 2005. Just over 600 samples (42 sampling runs) were collected in 2005, in accordance with the Systematic Random Sampling Strategy described in the NSSP. An additional 36 samples over five sampling runs were collected in selected Conditionally Approved areas to meet NSSP minimum requirements for open status sampling. Figures 1-6 depict growing areas and sampling stations. Appendix 1 lists current classification and acreages for all growing waters, while Appendix 2 presents the most recent 30 water samples collected as part of the Systematic Random Sampling program. Water quality in areas currently open to harvesting is generally good, although some sites show rainfall-related impacts that require management on a conditional basis. Results

from the routine monitoring program are reviewed in the “Update of Growing Area Classifications” section of this report.

The 2006 routine shellfish water-monitoring program will be conducted in a manner similar to the 2005 program, although the number and location of sampling stations will change. Four new sites will be needed per the results of a 2005 sanitary survey in Little Bay. To accommodate those new sites and other sampling needs, some existing sites will need to be eliminated from the program in 2006:

- Great Bay and Little Bay: the reclassification of Little Bay in July 2005 created the need for four new sites (GB25A and GB25B in Lower Little Bay, and GB6A and GB6B in Upper Little Bay. Each of these sites are located on new classification boundaries. The new sites make existing sites GB25, GB27, and GB28 expendable. Site GB82A in the Winnicut River will also be discontinued, as its data are similar to those from nearby GB82, and shallow water makes navigation to GB82A difficult/impossible unless the tide is high. Sampling may be discontinued at GB21 (mouth of Cocheco River) and GB22 (mouth of Salmon Falls River) if budget constraints dictate a smaller monitoring program, but for the time being it appears sampling will continue at these two sites in 2006.
- Hampton Harbor: Few changes are planned for 2006, but the completion of a sanitary survey for this growing area may lead to some changes in ambient monitoring site locations. A new site (HH38) will likely be created on the Taylor River, just west of the Hampton River Boat Club, on the boundary line between the Prohibited area associated with the marina, and the adjacent Conditionally Approved area. If budget constraints dictate a smaller monitoring program, sites HH5B and HH11 would be likely candidates for elimination.
- Little Harbor: No changes are planned for 2006.
- Rye Harbor: No changes are planned for 2006, although some/all of these sites may be eliminated if budget constraints dictate a smaller monitoring program.
- Atlantic Coast: No changes are planned for 2006.





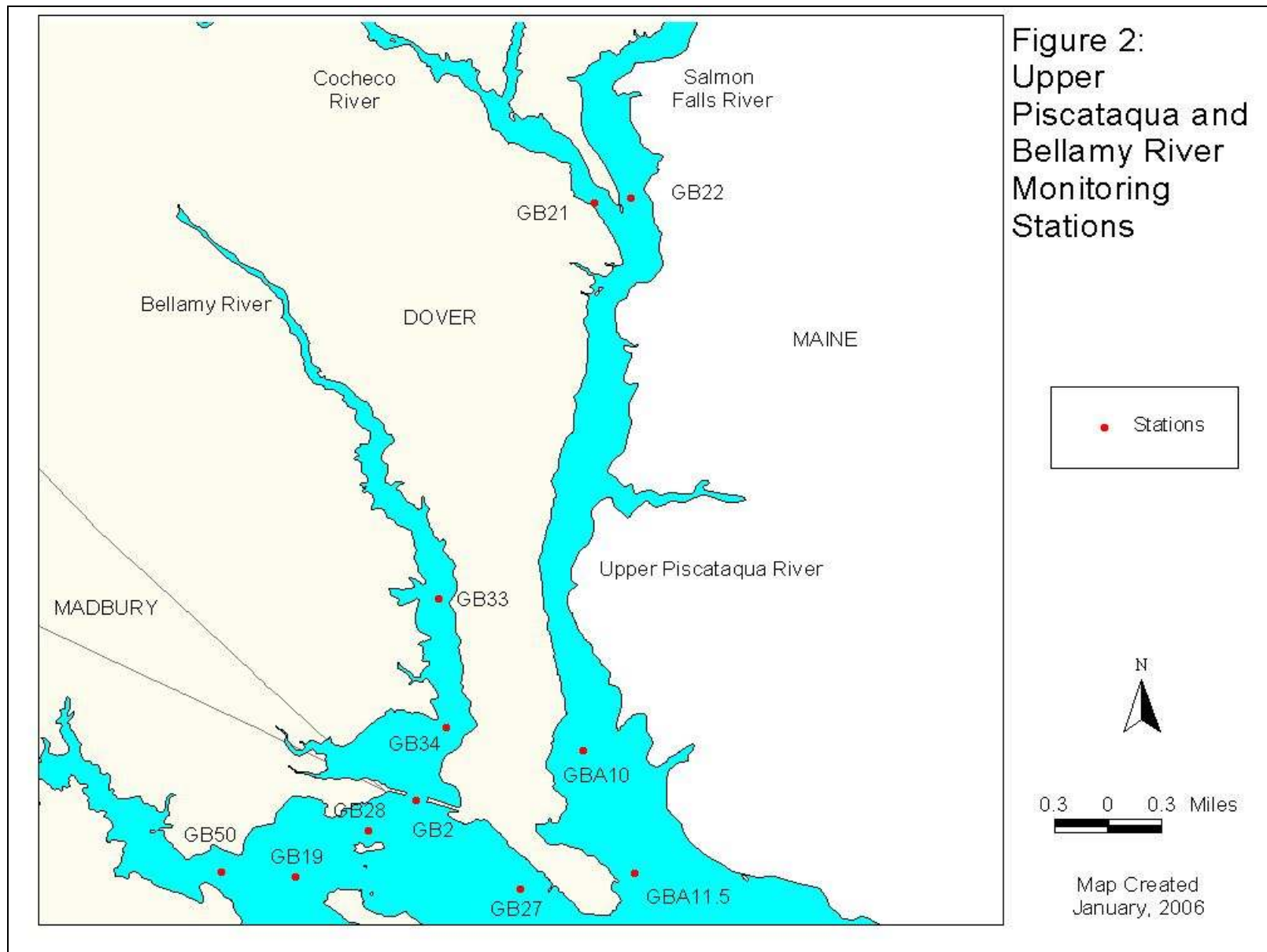




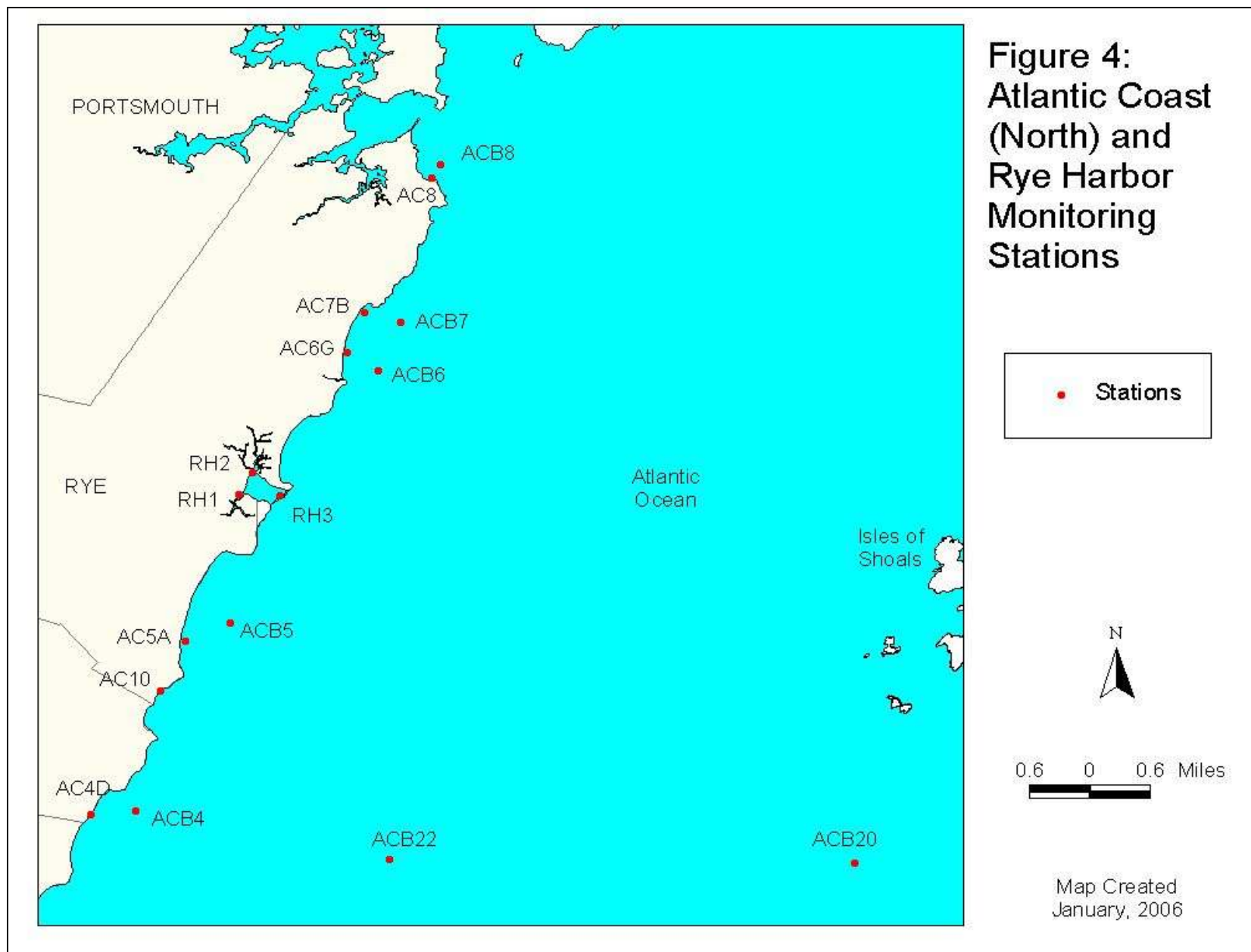
Figure 3:  
Little Harbor  
and Back  
Channel  
Monitoring  
Stations

• Stations



0.2 0 0.2 Miles

Map Created  
January, 2006



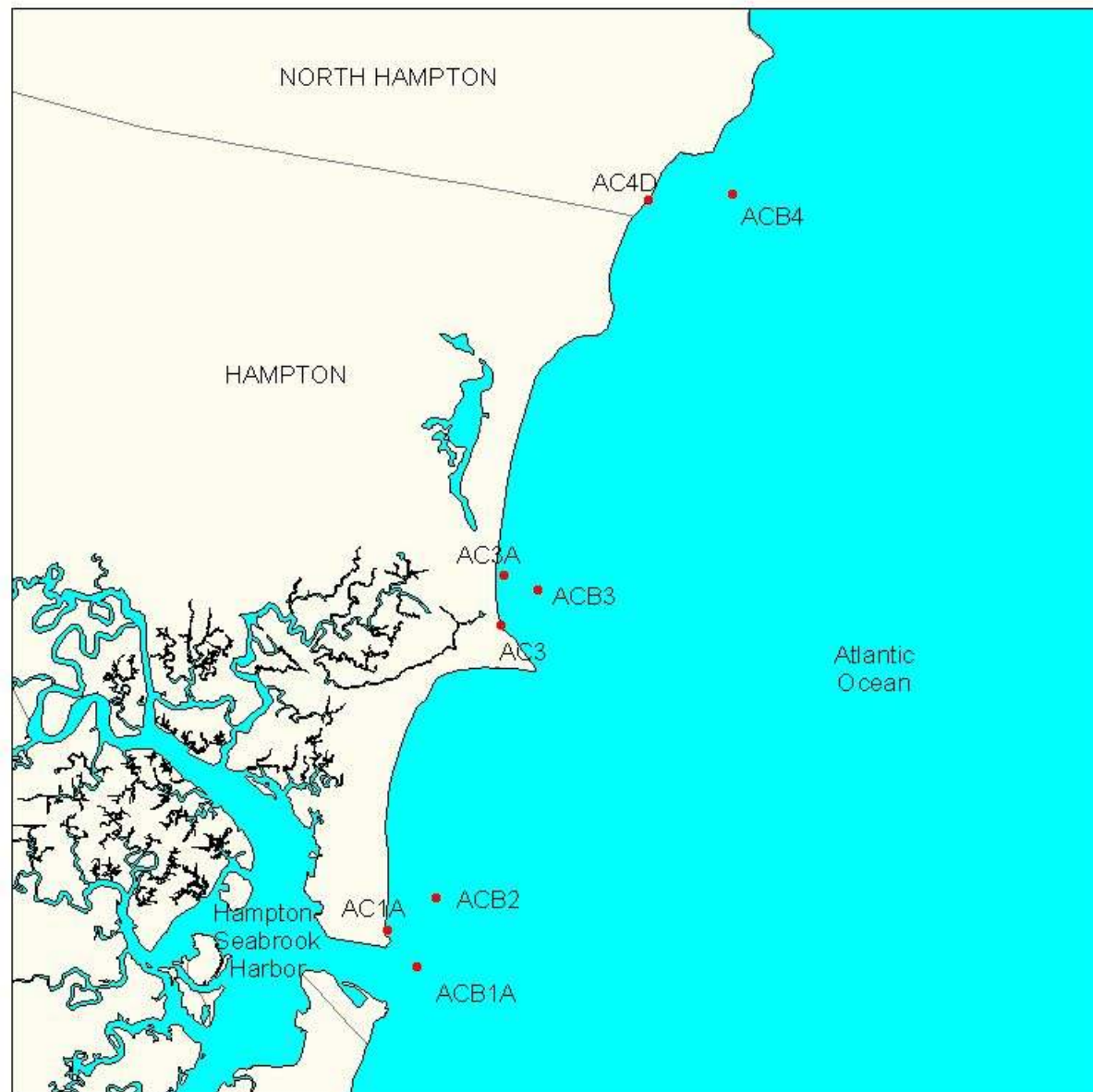


Figure 5:  
Atlantic Coast  
(South)  
Monitoring  
Stations

• Stations



0.4 0 0.4 Miles

Map Created  
January, 2006



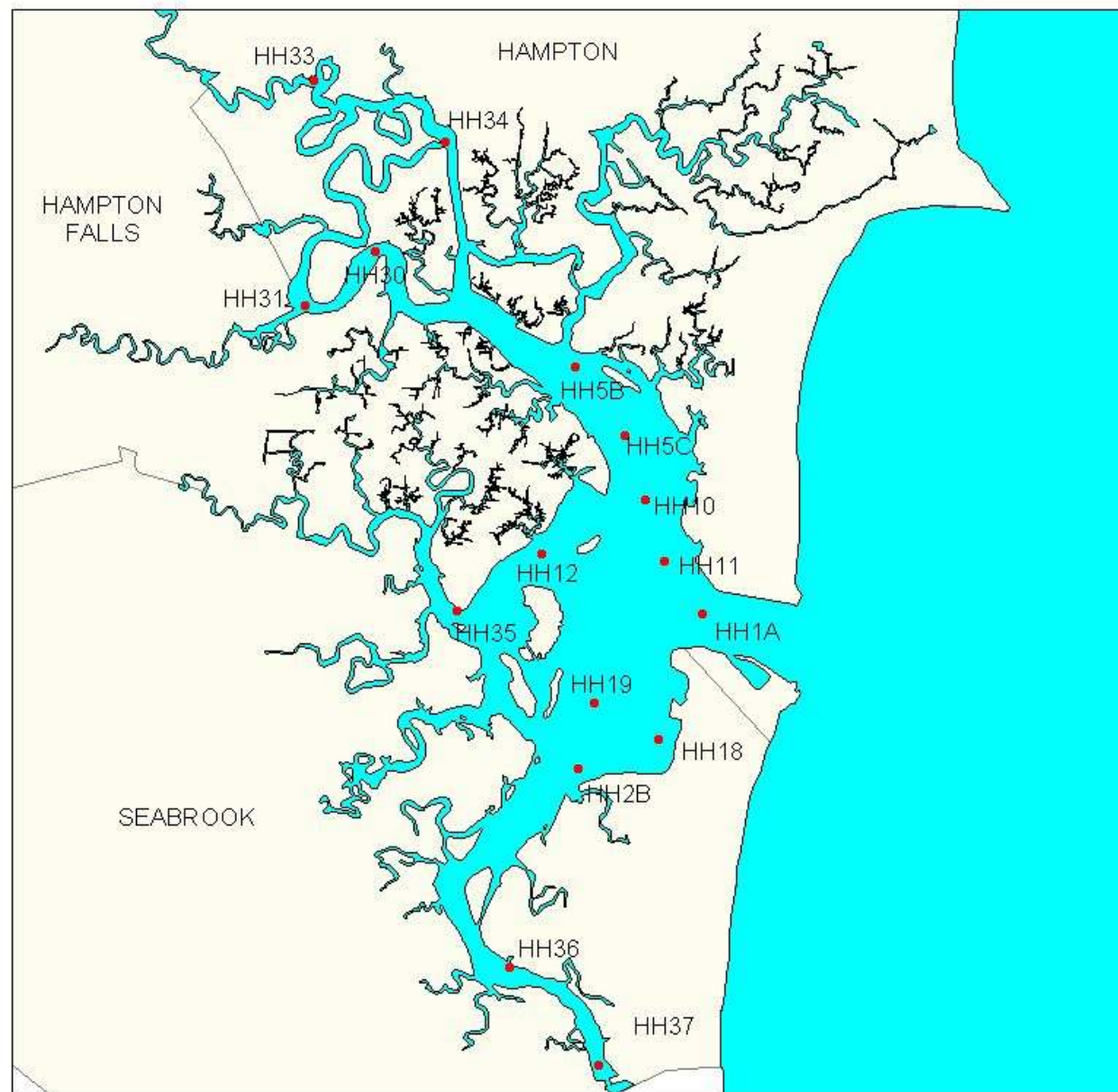


Figure 6:  
Hampton-  
Seabrook  
Estuary  
Monitoring  
Stations

• Stations



0.2 0 0.2 Miles

Map Created  
January, 2006

## Post Rainfall Monitoring

All estuarine waters that are open for harvest in New Hampshire are subject to closures following rainfall events. The amount of rain that causes contamination and warrants temporary closures ranges from 0.25 inches in Hampton/Seabrook to 1.50 inches in Great Bay and Little Bay. When such storms occur, DES conducts sampling of water and shellfish tissue in the days following the event to determine when the temporary closure can be lifted. In 2005, 131 post-rainfall samples were collected over the course of 31 sampling runs. A description of all rainfall-related closures is presented in a subsequent section of this report.

## Emergency Closure Monitoring

All estuarine waters that are open for harvest in New Hampshire are subject to temporary closures in the event of a discharge of raw or improperly treated sewage from area wastewater treatment facilities. Furthermore, all estuarine and coastal waters in New Hampshire are subject to area-wide closures for severe rainfall, defined as rainfall events of 2.50 inches or more. 2005 was characterized by numerous heavy rainfall and sewage discharge events, especially in the spring and fall. Emergency sampling activity was high, with 227 samples collected over the course of 42 sampling runs. The specific closures implemented in 2005 are discussed in a subsequent section of this report.

## Paralytic Shellfish Poison Monitoring

The waters of the Gulf of Maine are prone to “blooms” of microscopic algae that can produce potent neurotoxins, and filter-feeding shellfish can accumulate concentrations of these toxins such that the shellfish themselves become a public health threat to consumers. For this reason, the DES maintains a biotoxin monitoring program, focused on Paralytic Shellfish Poisoning (PSP).

The 2005 PSP season was marked by one of the most severe algal blooms on record, with most of the Gulf of Maine affected by high toxin levels and widespread harvesting closures from Maine to Cape Cod, Massachusetts. The New Hampshire monitoring program began with weekly blue mussel sampling in Hampton/Seabrook Harbor in April. Sampling at Star Island, Isles of Shoals began in the first week of May, and the high toxin level from the first sample collected at this site illustrated that an intense offshore algae bloom was already underway. This prompted DES to implement an immediate harvesting closure for offshore waters. A strong coastal storm with sustained winds from the east affected the area on the weekend of May 7-8, moving the algae bloom closer to shore. Within one week Hampton/Seabrook mussels began to show low levels of toxin, and by May 18 toxin levels were rapidly rising. The nearshore waters of the Atlantic coast and Hampton/Seabrook were closed to harvesting on May 19, 2005. Offshore mussels at Star Island also showed a rapid increase in toxin levels through May, peaking at over 1200 micrograms toxin per 100 grams of tissue in mid-June. The severe algae bloom and high toxin levels prompted DES to expand sampling to other areas, particularly in the Great Bay Estuary where some areas were still open for harvest. Sampling of blue mussels at Dover Point showed toxin levels rising in late May and into June, but not to levels that would warrant closure (one sample showed levels just under the mandatory closure level of 80 micrograms per 100 grams, but by this time the area was under a seasonal closure for boat sewage risk, so no PSP closure was necessary. Oyster sampling at Adams

Point showed no toxin in early June, but low levels of toxin were detected in mid-June. Levels at this site did not approach the mandatory closure limit. Sampling in Little Harbor was limited because a seasonal closure for boat sewage risk was in place before the PSP bloom affected inshore areas, but sampling was conducted to track the bloom's effect on this area. Moderate toxin levels were detected in June but had dropped to background levels when the area was next checked in October (prior to the lifting of the seasonal boat sewage risk closure). The effects of the PSP event were long lasting in Atlantic surf clams, a species well-known for retaining toxin for months after a bloom event is over. Elevated toxin levels in surf clams were detected in late May, with high levels evident throughout the summer. Levels began slowly declining through the fall, but a permanent lifting of the closure affecting surf clams could not be lifted until December 2005.

The severe PSP season required the collection of 87 samples, as compared to a typical sampling year of approximately 60 samples. A summary of the PSP closures affecting New Hampshire waters in 2005 is as follows:

- Offshore Atlantic waters closed to all harvesting for the period of 5/5/05 to 7/26/05 (85 days). The harvesting activity in this area affected was the offshore mussel aquaculture operation located approximately one mile south of White Island.
- Nearshore Atlantic waters closed to all harvesting on 5/19/05. The closure affecting blue mussels was lifted on 7/21/05 (64 days), but the harvest ban on surf clams was initially lifted on 9/21/05 (126 days). Surf clam harvesting was suspended in early October due to heavy rainfall. By early November the high bacteria levels from the October rainfall events had subsided, but precautionary surf clam sampling for PSP began to show elevated residual toxin levels. Data from other monitoring in New Hampshire and from neighboring states indicated that these elevated levels were not the result of a new PSP bloom, but rather was likely the result of inherent variability in the PSP test itself, coupled with some low residual levels of toxin. As a precaution, the closure of surf clam areas initially implemented after the October rainfall events was continued through early December. The closure was lifted after low PSP toxin results were observed over several consecutive weeks.
- Hampton/Seabrook Harbor was closed for harvest on the last two Saturdays of May (5/21/05 and 5/28/05). The area was closed not only for high PSP levels but also because of rainfall events in excess of the 0.25-inch closure threshold. Although PSP levels began dropping in this area in mid June and had dropped to background levels by mid July, the areas was under its typical seasonal closure for the period of June through October.

## Shellfish Tissue Testing

In 2005, sampling was conducted under baseline (dry weather) conditions, as well as after rainfall and releases of improperly treated sewage from wastewater treatment plants. The data (Appendix 3) were used to make open/closed decisions for a number of growing waters, and will be an invaluable dataset for future sanitary surveys. A total of 98 samples were collected in 2005.

## Pollution Source Identification and Evaluation

In support of sanitary survey development, a wide range of activities to identify, document, sample, and evaluate pollution sources in and near shellfish growing waters were undertaken in 2005. Targeted inspections and sampling of previously-identified sources was emphasized to complete sanitary surveys for selected growing areas (Hampton/Seabrook Harbor and Little Bay) or to collect data needed for annual/triennial sanitary survey reviews (Atlantic Coast, Little Harbor/Back Channel, and Great Bay).

The Great Bay shoreline survey (December 2004) established three new areas closed for harvesting (Crommet Creek, Pickering Brook, and Fabyan Point). Monitoring at these areas was continued in 2005 in the hopes of compiling adequate data to justify the reclassification of these areas in the future. The Little Bay shoreline survey revealed several pollution sources with potentially significant bacterial loading to Upper Little Bay. Hence, a great deal of activity was focused on evaluating the degree to which these sources affect the water quality in Upper Little Bay. The results of these efforts were used to reclassify Little Bay, including the establishment of a new area closed for harvesting (Branson Creek). Sampling in Hampton/Seabrook Harbor was conducted to evaluate the degree to which sources might affect the water quality in the harbor in order to help delineate new open closed boundaries for the Hampton/Seabrook Harbor Sanitary (currently in draft). In all, the work conducted in 2005 involved 31 sampling runs and investigation of 126 sites.

## Sanitary Surveys

DES had a goal of surveying most shellfish growing areas by the end of 2005. The following gives an overview of progress toward that goal, and the status of each project that is currently underway:

- Bellamy River: Sanitary survey published in October 2005. The southern portion of the river was reclassified from Prohibited/Unclassified to Conditionally Approved, with temporary closures to be implemented following 1) rainfall events of over one inch, 2) release of improperly treated sewage from the Durham or Dover wastewater treatment facilities, and 3) seasonal closure in the summer. The northern portion of the river to the head of tide dam was reclassified from Prohibited/Unclassified to Prohibited due to intermittently poor water quality from a number of pollution sources.
- Hampton/Seabrook: DES Shellfish Program plans to issue a new sanitary survey for the area in 2006. Work for this report has been ongoing since 2000. An updated shoreline survey for pollution sources was conducted in 2005. A final report is currently being drafted.
- Little Bay: A final sanitary survey was issued in July 2005. Harvesting conditions relating to rainfall (closure after events of more than 1.50 inches) and wastewater treatment plant performance at the Durham and Dover wastewater treatment facilities were continued from a previous survey. However, the methodology for addressing seasonal boat sewage contamination risk was changed. The presence of boats with the capability of discharging raw or treated sewage in Little Bay creates a public health risk that must be evaluated and managed. The previous classification of Little Bay included relatively small Prohibited areas



around Great Bay Marine and the Little Bay Boat Club. Waters adjacent to these Prohibited areas would be seasonally closed when the sewage contamination risk posed by the number of boats present exceeded the Prohibited areas' capacity to dilute the sewage risk to acceptable levels. Each year the date of closure would vary, depending on when boats were actually taken out of winter storage and put on the moorings or slips. Given the confusion that the seasonal closures were causing among harvesters, a decision to adopt one large Prohibited area, sized to accommodate boat sewage risk from the marinas/mooring fields at full occupancy, was made in consultation with NH Fish and Game law enforcement and marine fisheries staff. This large prohibited area eliminates the need for seasonal closures, so adjacent waters will only be subjected to the rainfall and WWTF conditions noted previously. Another Prohibited area was developed for the mooring field near Adams Point using the same full-occupancy assumption. The adoption of this strategy not only will reduce confusion and facilitate enforcement, but will also make for more harvesting opportunities (on an acre-day basis).

- Upper Piscataqua River: Sanitary survey was begun in 2002, and will be completed in 2006. The survey for this area will be merged with surveys for the Cocheco and Salmon Falls rivers. A key component of the survey was the completion of a dye/dispersion study of the Dover wastewater facility's effluent in the Piscataqua River. The completion of that study enabled a delineation of a Prohibited/Safety Zone area around the outfall, which will encompass much of the river. Classification of areas adjacent to the safety zone will be finalized when the sanitary survey is completed in 2006.

DES originally set a goal of classifying all waters by the end of 2005, but this was amended in 2004 in consultation with several project partners. DES and the NHEP agree that classification of the lower Piscataqua River and Portsmouth Harbor (approximately 14 percent of the total estuarine acreage) should be delayed until a new NPDES permit is issued for the Portsmouth wastewater treatment facility, as the new permit may include provision for a reconstructed outfall. The new outfall may include a multiport diffuser which could affect how the area is ultimately classified. Classification of Rye Harbor and other small areas around the coast will also be postponed indefinitely. Thus, DES has revised its goal of shellfish water classification, targeting a figure of approximately 85 percent of all estuarine waters.

## **Other Activities**

### **Wastewater Treatment Facility Dye Studies**

The NSSP calls for the establishment of permanently closed Prohibited areas, or "safety zones," around all wastewater treatment plant outfalls. These zones not only serve as buffers for relatively minor difficulties in wastewater treatment (e.g., occasionally elevated bacterial levels in plant effluent relative to discharge permit limitations) but also serve to protect harvesters from shellfish that may be contaminated by more serious plant failures (e.g., malfunction of disinfection systems). These safety zones are sized to cover the area that would be contaminated during the period of time required for plant operators to discover a problem and notify state authorities, and the time required for state authorities to institute an emergency closure of shellfish harvesting areas.

Factors such as plant discharge characteristics (e.g., volume and bacterial concentration), as well as current speeds and available dilution capacity of the surrounding waters, are important to properly sizing the Prohibited area. Dye/dilution studies are often utilized to gather accurate data on the dilution capacity and time of travel characteristics around a wastewater treatment plant outfall.

No new dye studies were conducted in 2005. Field work for a rather complex dye study on the Dover WWTF was completed in 2004, and the report was completed in December 2005. In consultation with US FDA's Center for Food Safety and Applied Nutrition in Maryland, this study developed a new methodology for adjusting dye study data to account for how future (higher) flows might affect dilution, and subsequent Prohibited area delineation around an outfall.

#### Annual Program Review by USFDA

In February 2002, the US Food and Drug Administration (FDA) recognized New Hampshire as a "shellfish-producing" state because its shellfish regulatory programs (growing water classification, commercial handling, and patrol) comply with the National Shellfish Sanitation Program. This recognition, which is maintained through a satisfactory annual program review by FDA, allows New Hampshire companies, including aquaculture operations, to engage in interstate commerce. For the most recent program review, staff met with FDA over the course of several days in 2005 to perform site visits, review files, and other activities to help FDA evaluate the program. FDA issued its report in October 2005, finding the DES Shellfish Program to be in compliance with the relevant aspects of the NSSP.

#### Outreach Initiatives

The DES Shellfish Program engages the public through a number of outreach initiatives. The most significant of these is the development and maintenance of the program website (<http://www.des.state.nh.us/wmb/shellfish>), which not only gives information relevant to recreational harvesting (fact sheets, maps, FAQs, tide charts, information on openings/closings), but also provides access to a number of shellfish-related reports, including the 2004 DES Shellfish Program Annual Report). Recent additions to the site include enhanced maps and explanations of reclassified areas such as Great Bay, Little Bay, and the Bellamy River, all designed to assist harvesters in identifying new open/closed boundaries. Harvesters were invited to a presentation summarizing the revised classification of Great Bay delivered at a Great Bay Coast Watch meeting in June.

As has been the case in previous years, the DES Shellfish Program continues to involve citizen volunteers from the Great Bay Coast Watch in several aspects of the program. These include collection and transportation of mussel samples for PSP testing at Star Island, sampling of pollution sources, assistance in conducting ambient monitoring, and other activities. DES intends to continue to offer opportunities for volunteer involvement in 2006.

## Quality Assurance Programs

The DES Shellfish Program developed and implemented Quality Assurance Project Plans (QAPPs) for bacterial monitoring, paralytic shellfish poison monitoring, and sanitary surveys in 2002. Each of these plans describes data collection methods, monitoring objectives, training needs, data review, documentation, management, and reporting, and other issues relative to the collection of environmental data. Ultimately, each QAPP outlines data collection such that the quality of the data generated by the monitoring program is known, thus enabling potential data users to determine the degree to which the data suit their own needs. Implementation of these QAPPs in 2005 is described below.

The Water Quality Monitoring QAPP stipulates:

- Annual coordination meeting with key personnel: No meeting was held in 2005. Coordination was achieved via emails on an as-needed basis.
- Training in monitoring procedures: A review of monitoring procedures was done on an ongoing basis during individual sampling runs when volunteers assisted with collection.
- Maintenance of a list of trained personnel: list was maintained at the DES Pease field office.
- Sampling of all conditionally approved areas to occur at least six times per year: this was accomplished, as noted in Appendix 2.
- Calibration of equipment (thermometers): For 2005, calibration dates were April 1 and August 5, 2005. Spreadsheets containing the calibration date, calibrator(s), and appropriate correction value, if applicable, are maintained at the DES Pease field office.
- Preparation of quarterly reports: quarterly report was submitted to the NH Estuaries Project, per conditions of an interagency agreement, in October 2005. Final report submitted in January 2006. NH Coastal Program semiannual reports were submitted, per grant conditions, in June 2005 and December 2005.

The Paralytic Shellfish Poison Monitoring QAPP stipulates:

- Weekly emails to appropriate lab and field staff to ensure coordination: this was done for the period of April through October.
- Monitoring of laboratory precision and establishment of new “CF” values as needed: Jayne Finnigan of the DHHS Public Health Laboratory reported that the laboratory maintained acceptable precision throughout the sampling period, with no new CF values needed.
- Documentation of the number of samples collected: 36 Hampton Harbor samples, 20 Star Island samples, 10 Hampton Beach samples, eight Little Bay samples, six Little Harbor samples, three offshore Atlantic aquaculture site samples, three Great Bay samples, and one Rye Harbor sample. Reporting of all PSP Closures: Off shore Atlantic closure memo issued May 5, 2005. Near shore Atlantic and Hampton closure memo issued May 19, 2005. Near shore Atlantic (excluding surf clams) and Hampton reopening memo issued July 21, 2005. Offshore Atlantic reopening memo issued July 26, 2005. Near Shore Atlantic (surf clams) reopening memo issued September 22, 2005.

The Sanitary Survey QAPP stipulates:

- Annual coordination meeting with key personnel: No meeting was held in 2005. Coordination was achieved via emails on an as-needed basis.
- Training in monitoring procedures, to be held at annual meeting of key personnel: A review of monitoring procedures was done on an ongoing basis during individual sampling runs when volunteers assisted with collection.
- Document growing areas for which sanitary surveys are under development: Little Bay and the Bellamy River were completed in July and October 2005 (respectively). Three separate surveys for the Upper Piscataqua River, Cocheco River, and Salmon Falls River were merged into one growing area, termed the Piscataqua River North shellfish management area. The sanitary surveys for this area and for Hampton/Seabrook Harbor are still underway.
- Calibration of equipment (thermometers): For 2005, calibration dates were April 1 and August 5, 2005. Spreadsheets containing the calibration date, calibrator(s), and appropriate correction value, if applicable, are maintained at the DES Pease field office.
- Verify that tidal and stratification data are of acceptable quality: No tidal studies or dye/dispersion studies were conducted in 2005.